COBALT FAST NEUTRON CROSS SECTIONS - MEASUREMENT AND EVALUATION*

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ABSTRACT

Elastic and inelastic scattering cross sections of cobalt are measured from incident energies of 1.8 to 4.0 MeV including those for the excitation of states at 1.10 ± 0.01, 1.20 ± 0.01, 1.30 ± 0.01, 1.43 ± 0.01, 1.46 ± 0.02, 1.72 ± 0.02, 2.06 ± 0.02, 2.09 ± 0.02, 2.16 ± 0.03, 2.35 ± 0.05 and 2.50 ± 0.05 MeV. Total neutron cross sections are measured from $\tilde{\sim}$ 2.0 to 4.5 MeV. From the experimental results, and previously reported values, an optical-statistical model is deduced providing a quantitative description of measured values to 20.0 MeV. The observed excited structures and cross sections are shown consistent with a nuclear structure model based upon a proton hole in the $f_{7/2}$ shell strongly coupled to a spherical core and a solution of previous ambiguities in J^{π} assignments is suggested. The available experimental information and the computational model are utilized to provide a comprehensive evaluated data file in the ENDF format suitable for use in fission reactor, fusion reactor and other applied neutronic calculations. This evaluated file is explicitly presented in the Appendix.

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